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<p>(21) International Application Number: PCT/EP95/02460 (22) International Filing Date: 23 June 1995 (23.06.95)</p> <p>(30) Priority Data: TO94A000534 29 June 1994 (29.06.94) IT</p> <p>(71) Applicant (<i>for all designated States except US</i>): URMET S.P.A. COSTRUZIONI ELETTRICO-TELEFONICHE [IT/IT]; Via Bologna, 188/C, I-10154 Torino (IT).</p> <p>(72) Inventor; and (75) Inventor/Applicant (<i>for US only</i>): MONDARDINI, Massimo [IT/IT]; Via Mazzini, 40, I-10123 Torino (IT).</p> <p>(74) Agent: MODIANO, Guido; Modiano & Associati, Via Meravigli, 16, I-20123 Milano (IT).</p>		(81) Designated States: AU, BR, CA, CN, JP, KR, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i>
<p>(54) Title: DEVICE AND METHOD FOR DETECTING ATTEMPTS AT FRAUD IN READERS OF THE INTEGRATED-CIRCUIT TYPE TELEPHONE CARDS</p> <p>(57) Abstract</p> <p>The device comprises: a pair of superimposed metallic laminae (17-17'), the chip-card (11) being arranged therebetween; the laminae are arranged inside the slot (13) of the reader (10) so that they are adjacent to the set (14) of the card reading contacts but physically separated therefrom; an electronic switch (19) for disconnecting, under the control of a microprocessor, the reading contacts (14) from the reading circuits (16) and for periodically connecting them to an oscillator (20) that generates a test signal (st), which is picked up by the laminae (17-17'); and a detector circuit (18) connected to the laminae and adapted to detect the signal (si) induced thereon so as to provide a useful voltage signal (sv) that is significantly increased above a preset threshold when the chip-card has leads that connect, for fraudulent purposes, the laminae contacts (12) of the chip of the card to an apparatus arranged outside the reader.</p> <pre> graph LR RC[READING CIRCUITS] --> ES[ELECTRONIC SWITCH] FG[TEST FREQUENCY GENERATOR] --> ES FG -- st --> SW[SWITCH] SW --> RC SW --> FG SW --> DC[DETECTOR CIRCUIT] DC -- si --> AID[A/D] AID -- sv --> MP[MP] MP -- TF[TELEPHONE SET] READER[READER] -- 14 --> RC READER -- 12 --> DC READER -- 10 --> SW READER -- 13 --> FG READER -- 17 --> FG READER -- 17' --> FG READER -- 11 --> DC </pre>		

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DEVICE AND METHOD FOR DETECTING ATTEMPTS AT FRAUD IN
READERS OF THE INTEGRATED-CIRCUIT TYPE TELEPHONE CARDS

Technical Field.

The present invention relates to a device and a method for detecting attempts at fraud in readers of the integrated-circuit type telephone cards, commonly known by the term "chip-cards" which will be used hereinafter.

Background Art.

5 It is known that chip-card readers are provided with so-called "pin" reading contacts which, when the card is inserted into the slot of the reader, lower onto corresponding laminae associated with the integrated circuit, or chip, of the card to establish an electrical
10 connection between said chip and the circuits associated with the reader, in order to allow bidirectional transfer of data from the chip to the circuits of the reader and vice versa.

In order to fraudulently pick up the exchange of data
15 between the reader and the chip-card, or to simulate the behaviour of said chip-card towards the telephone set, a generic chip-card can be altered and provided with a bundle of leads, each connected to a respective contact of the chip, which are laid along the card or are recessed
20 flush in appropriate slots milled therein, are guided out of the reader slot, and are connected to auxiliary devices that are adapted for example to memorize the data exchanged between the card and the circuits of the reader, in order to reproduce them on counterfeit cards or to
25 alter the dialog data, for example by giving the reader a

false indication that deletion has occurred or, as mentioned above, to simulate, towards the telephone set, the behaviour of a chip-card.

Disclosure of the Invention.

The aim of the present invention is to eliminate 5 these attempts at fraud by means of a device that is associated with the slot of the reader, is adapted to detect the presence of said bundle of leads, and has the specific features stated in the appended claims.

Substantially, the invention is based on the concept 10 of sending, to each pin of the reading contacts, preferably in a periodic manner, an oscillating test signal having for example frequencies of a few tens of kHz; of irradiating with said signal a pair of oppositely arranged metallic laminae located adjacent to said reading 15 contacts but electrically separated therefrom, the card being tested inside the slot arranging itself between said laminae; and of detecting, by means of an amplifier and rectifier circuit, the signal received by said laminae, which varies significantly whether in the absence or in 20 the presence of said bundle of leads arranged on the card for fraudulent purposes and is much stronger when they are present due to the greater irradiating effect produced by said leads, the test signal also flowing therethrough.

It is thus possible to set a threshold for the 25 detected signal; when this threshold is exceeded, a signal is sent to the telephone set and indicates that leads or other means provided for fraudulent purposes are present on the card and/or disables said telephone set.

Brief description of the drawings.

The features, purposes, and advantages of the device according to the present invention will become apparent from the following detailed description and with reference to the accompanying drawings, given by way of non-limitative example, wherein:

figure 1 is a block diagram of the device according to a preferred embodiment of the present invention, shown in the configuration for reading a genuine chip-card;

figure 2 is a view of a detail of figure 1, illustrating the device in the configuration for reading a chip-card that has been tampered with for fraudulent purposes.

Ways of carrying out the invention.

Referring to figure 1, the reference numeral 10 designates a reader for chip-cards 11 which are constituted, in a known manner, by a support made of rigid polymeric or paper-based material that includes an integrated circuit or chip, a plurality of contact laminae 12, arranged flush with one face of the card, being associated therewith.

20 The reader 10 comprises a slot 13 for inserting the card 11 and is internally provided with a block of reading contacts 14 that is formed by a plurality of protruding connectors or pins 15 that are adapted to lower onto the laminae 12 of the card 11 when said card is fully inserted 25 in the slot 13 in order to establish an electrical connection between the chip of the card 11 and the reading circuits 16 associated with the reader 10.

According to the invention, a pair of facing but mutually separated metallic laminae 17-17' is arranged inside the slot 13 of the reader 10, the card 11 arranging itself between said laminae, as clearly shown in the 5 figure.

Advantageously, the laminae 17-17' are made of the known metal alloy known as nickel silver, and each lamina has a thickness of two tenths of a millimeter and is insulated by means of an adhesive protective sheet, for 10 example a sheet of embossed polycarbonate, of the type known by the trade-name "Makrofol D", produced by the Bayer company.

The pair of laminae 17-17' is arranged adjacent to the block of the reading contacts but is physically 15 separated therefrom; for example, the block 14 and the pair of laminae 17-17' are mutually separated by a gap of ten millimeters. One end of each lamina 17-17' is connected, by means of a respective lead, to a detector circuit 18 comprising an amplifier A, a filter F, and a 20 rectifier R, whose function will be described hereinafter.

Furthermore, according to the invention, the block 14 of the reading contacts is connected to the reading circuits 16, with the interposition of an electronic switch 19 which, under the control of a microprocessor, 25 for example the microprocessor μP of the telephone set TF with which the reader 10 is associated, disconnects the contacts 14 from the circuit 16 and connects them to an oscillator 20. The oscillator 20, also controlled by an activation command sent by the microprocessor μP , is

provided so as to generate an oscillating test signal "st" with a frequency comprised for example between 80 and 110 kHz which, by means of the switch 19, is sent to the contacts 14 in a periodic manner, for periods lasting 5 between 70 and 120 milliseconds during the telephone call or in any case during the pause when data exchange between the chip of the card and the circuits 16 is interrupted.

Due to the nearness of the contacts 14 to the laminae 17-17', said laminae are adapted to pick up the signal 10 irradiated by the contacts 14, for which they behave as true antennas. Accordingly, the laminae 17-17' become the seat of an induced signal "si" having the same frequency as the test signal "st" and a strength that depends on the preset and constant distance between said laminae and the 15 contacts 14 and of course on the strength of the test signal, also having a preset value.

The induced signal "si" is applied to a detector 21 that amplifies it in A, processes it with the filter F tuned to the frequency of the test signal, and rectifies 20 it in R, providing in output a useful voltage signal "sv" which, by means of an A/D converter, is sent to the microprocessor of the telephone set TF.

The insertion of a genuine chip-card 11 into the slot 13 does not significantly alter the detected useful signal 25 "sv", the (average) level whereof, in these conditions, is taken as reference threshold.

The level of the useful signal "sv" is instead altered significantly, and typically increased to a value "sw" that is significantly higher than said reference

threshold, when a fraudulently tampered chip-card such as the one designated by the reference numeral 110 in figure 2 is inserted into the slot 13.

The tampered chip-card 110 comprises a bundle of 5 leads 111 connecting to the contact laminae 12, running along said card, and possibly recessed flush in a milling provided for this purpose to exit from the slot of the reader and connect to an apparatus 30, typically constituted by a PC. The apparatus 30 can be used 10 fraudulently, for example to provide the reading circuits 16 with false indications that deletion has occurred or to simulate, towards said reading circuits, the behaviour of a valid chip-card, or for other equally fraudulent purposes.

15 With the arrangement according to the invention, the test signal "st" also flows along the leads 111 connected to the laminae 12, and since said leads are closer to the laminae 17-17', they allow said laminae to pick up a significantly stronger signal, thus producing a 20 corresponding increase in the signal "sw", which exceeds said threshold value.

The presence of a signal "sw" that is higher than the threshold value causes the intervention of the microprocessor, which sends an alarm signal to the 25 telephone set and/or disables it.

The details of execution and the embodiments may of course be altered extensively with respect to what has been described and illustrated by way of non-limitative example without altering the concept of the invention and

without thereby abandoning the scope of the invention defined by the appended claims, wherein the reference numerals are given only for the sake of better comprehension.

CLAIMS

1 1. Device for detecting attempts at fraud in readers
2 of telephone cards known as chip-cards, characterized in
3 that it comprises a pair of superimposed metallic laminae
4 (17-17'), the chip-card (11) being arranged therebetween,
5 said laminae being arranged inside the slot (13) of the
6 reader (10) so that they are adjacent to the block (14) of
7 the card reading contacts but physically separated
8 therefrom; an electronic switch (19) for disconnecting,
9 under control of a microprocessor (μ P), the reading
10 contacts (14) from reading circuits (16) and to
11 periodically connect said contacts (14) to an oscillator
12 (20) that generates a test signal (st), which is picked up
13 by said laminae (17-17'); a detector circuit (21) being
14 connected to said laminae for detecting the signal (si)
15 induced thereon so as to provide a useful voltage signal
16 (sv) that is significantly increased (sw) above a preset
17 threshold when the chip-card (110) has leads (111) adapted
18 to connect, for fraudulent purposes, the lamina contacts
19 (12) of the card chip to an apparatus (30) arranged
20 outside the reader.

1 2. Device according to claim 1, characterized in that
2 the test signal (st) is of the oscillating type, with
3 frequencies between 80 and 110 kHz, and in that said
4 signal is applied to the reading contacts (14) for periods
5 between 70 and 120 milliseconds, during the pauses when
6 the exchange of data between the chip of the card (11) and
7 the reading circuits (16) is interrupted.

1 3. Device according to claims 1 and 2, characterized
2 in that the microprocessor controlling said electronic
3 switch (19) is the microprocessor of the telephone set.

1 4. Device according to the preceding claims,
2 characterized in that the useful voltage signal (sv)
3 present at an output of the detector (21) is sent to said
4 microprocessor and in that said microprocessor, in the
5 presence of a useful signal (sw) exceeding a preset
6 threshold value, sends an alarm signal to the telephone
7 set and/or disables said set.

1 5. Device according to the preceding claims,
2 characterized in that the detector (21) comprises at least
3 one amplifier, a filter tuned to the frequency of the test
4 signal, and a rectifier.

1 6. Device according to claim 1 and any one of claims
2 2 to 4, characterized in that said laminae (17-17') are
3 made of a metal alloy known as nickel silver, have a
4 thickness of one to three tenths of a millimeter, and are
5 insulated by an adhesive protective sheet.

1 7. Method for detecting attempts at fraud in readers
2 of telephone cards known as "chip-cards", characterized in
3 that it consists in sending an oscillating test signal
4 (st) onto pins of contacts (14) for reading the chip of
5 the card (11), in irradiating with said test signal (st)
6 two oppositely arranged metallic laminae (17-17'),
7 arranged adjacent to said reading contacts (14) but
8 electrically separated therefrom, said chip-card being
9 arranged between said laminae inside the slot (13) of a
10 reader (10), and in detecting, in order to generate an

11 alarm signal (sw-sv), the signal (si) picked up by said
12 laminae, the picked-up signal being significantly altered
13 whether in the absence or in the presence of leads (111)
14 provided on the chip-card for fraudulent purposes.

1/2

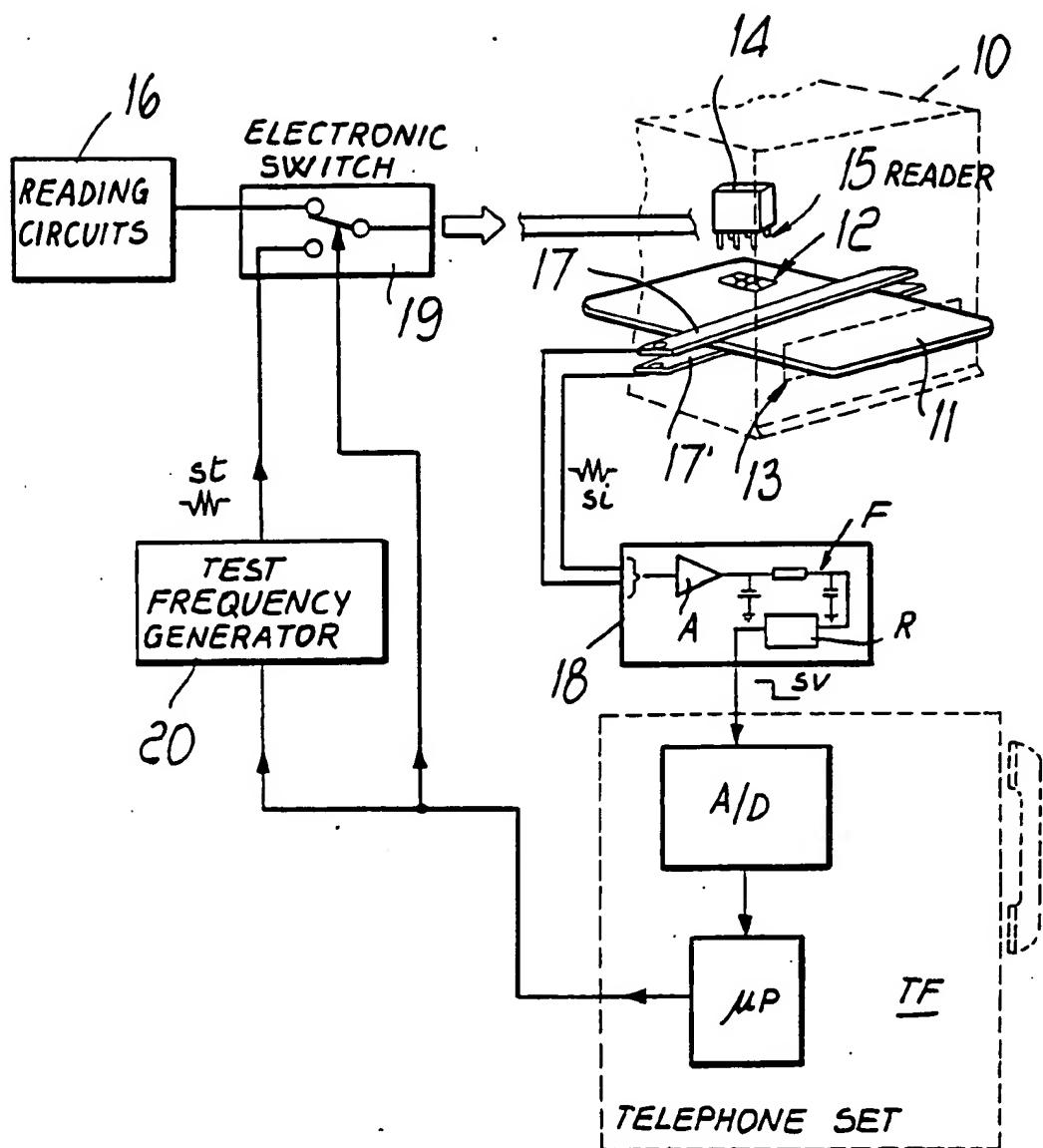


FIG. 1

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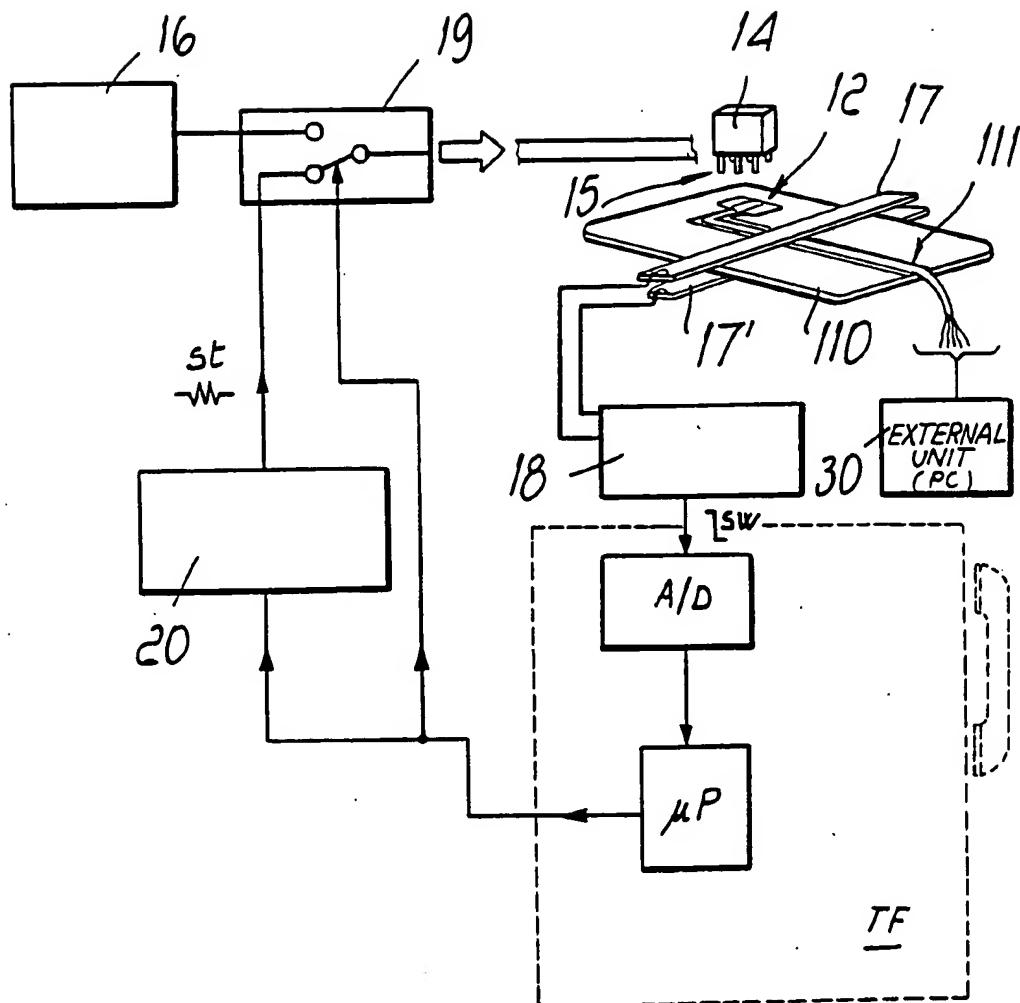


FIG. 2

INTERNATIONAL SEARCH REPORT

Inten...al Application No

PCT/EP 95/02460

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G06K7/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP,A,0 323 347 (SCHLUMBERGER INDUSTRIES) 5 July 1989	1,7
A	see the whole document ----	2,4-6
Y	FR,A,2 693 014 (MONETEL) 31 December 1993	1,7
A	see the whole document -----	3-5
A	EP,A,0 447 686 (ALCATEL) 25 September 1991 see the whole document -----	1-4,7
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Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Intern. Appl. No.

PCT/EP 95/02460

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		DE-A-	3871931	16-07-92
		US-A-	4999601	12-03-91
FR-A-2693014	31-12-93	NONE		
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